



Seasonal simulation of tropospheric ozone over the midwestern and northeastern United States: An application of a coupled regional climate and air quality modeling system

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Abstract:

The impacts of air pollution on the environment and human health could increase as a result of potential climate change. To assess such possible changes, model simulations of pollutant concentrations need to be performed at climatic (seasonal) rather than episodic (days) time scales, using future climate projections from a general circulation model. Such a modeling system was employed here, consisting of a regional climate model (RCM), an emissions model, and an air quality model. To assess overall model performance with one-way coupling, this system was used to simulate tropospheric ozone concentrations in the midwestern and northeastern United States for summer seasons between 1995 and 2000. The RCM meteorological conditions were driven by the National Centers for Environmental Prediction/Department of Energy global reanalysis (R-2) using the same procedure that integrates future climate model projections. Based on analyses for several urban and rural areas and regional domains, fairly good agreement with observations was found for the diurnal cycle and for several multiday periods of high ozone episodes. Even better agreement occurred between monthly and seasonal mean quantities of observed and model-simulated values. This is consistent with an RCM designed primarily to produce good simulations of monthly and seasonal mean statistics of weather systems.

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Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Other Climate Scenario

Other Climate Scenario: National Centers for Environmental Prediction/Department of Energy global reanalysis

Exposure :

weather or climate related pathway by which climate change affects health

Air Pollution, Temperature

Air Pollution: Ozone

Climate Change and Human Health Literature Portal

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

Urban

Geographic Location: ☒

resource focuses on specific location

United States

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Methodology

Resource Type: ☒

format or standard characteristic of resource

Research Article, Research Article

Timescale: ☒

time period studied

Short-Term (